

WESTERN CENTRAL ATLANTIC FISHERY COMMISSION

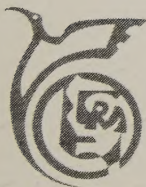
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Report of the

FIRST MEETING OF THE WECAFC AD HOC WORKING GROUP ON THE DEVELOPMENT OF SUSTAINABLE MOORED FISH AGGREGATING DEVICE FISHING IN THE LESSER ANTILLES

Le Robert, Martinique, 8-11 October 2001

Ifremer



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PREPARATION OF THIS DOCUMENT

This document was prepared by the Food and Agriculture Organization of the United Nations (FAO), which organized the First Meeting of the WECAFC Ad Hoc Working Group on the Development of Sustainable Moored Fish Aggregating Device Fishing. It includes information on the status of FAD development and fishing activities in the Lesser Antilles. It also includes an account of the group's deliberations and a record of the decisions and recommendations that the group made relative to the objectives of the Meeting.

The work was accomplished under the guidance and supervision of FAO/WECAFC/FIIT.

The National Reports and all the contributions presented during the meeting will be published as a supplement to this FAO Fisheries Report.

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Report of the First Meeting of the WECAFC Ad Hoc Working Group on the Development of Sustainable Moored Fish Aggregating Device Fishing in the Lesser Antilles. Le Robert, Martinique, 8-11 October 2001.

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ABSTRACT

This report provides a summary of the proceedings of the First Meeting of the WECAFC Ad Hoc Working Group on the Development of Moored Fish Aggregating Device Fishing in the Lesser Antilles.

The major topics on the group's agenda included:

- synthesizing the knowledge on moored FAD fishing technology in the Lesser Antilles - as a reference point for the future;
- identifying information needs to achieve sustainable development of moored FAD fishing; and
- making recommendations for cooperation in research, development, and management of FAD fishing in the Lesser Antilles.

The meeting agreed that:

- There was a need to standardize the classifications and definitions of fishing vessels and effort, among countries, to facilitate comparisons for statistical purposes.
- There was an urgent need to rationalize national regulations for mitigating against the harvesting of juvenile of the highly migratory species that associate with moored FAD.
- Case studies should be done on the various strategies currently used to manage moored FAD fishing in the countries, and presented at the next meeting of the group.
- Further research on various designs of FAD and construction materials was necessary.
- The preparation of FAD development plans should be incorporated in National fisheries management plans for large pelagic fish species.
- Information should be exchanged on all aspects of moored FAD fishing among the members of the group

The meeting agreed on the terms of references of the ad hoc working group.

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BACKGROUND AND OBJECTIVES

1. At the International Symposium on "Tuna Fishing and FAD", which was held in October 1999 in Martinique, the issue of exchanging scientific information on the use of FAD around the world was discussed. Following the symposium, the French Research Institute for the Exploitation of the Sea (Ifremer) approached the WECAFC Secretariat offering to collaborate in establishing a network to:

- discuss the use of a standardized database to monitor the exploitation of pelagic fish species in the Lesser Antilles; and
- promote subregional research and exchange of information on appropriate fishing methods around moored FAD.

2. Ifremer's offer was considered further at the FAO sponsored workshop on "The Effects of Globalization and Deregulation on Fisheries". Lesser Antilles participants at that workshop agreed that FAO should use its good office to stimulate dialogue between Ifremer and the countries, and jointly organize a meeting on the Sustainable Development of Moored FAD Fishing. It was also agreed that such a group could be established under the aegis of the WECAFC, taking the form of the existing ad hoc working groups of the Commission. Ifremer and WECAFC/FAO further agreed to co-sponsor the first meeting during 2001.

3. The first Meeting of the proposed working group was convened at the Ifremer Station, Le Robert, Martinique, during the period 8 to 11 October 2001.

4. The Meeting was jointly organized by the Ifremer Antilles Station in Martinique and the FAO/WECAFC, with financial and technical support from the Conseil Régional, the Conseil Général, Europe (FEDER), and the FAO Fisheries Industry Division (FIIT), respectively.

5. The objectives of the Meeting were:

- to generally exchange information on national experiences with FAD fishing;
- to examine the technical and scientific issues involved in FAD construction and deployment;
- to examine the quantitative and qualitative information available or required for the development sustainable FAD fishing activities;
- to establish a subregional reference point on present status FAD fishing development; and
- to promote subregional cooperation in the development and management of FAD fishing.

OPENING CEREMONY

6. The chairperson of this session, Mr Lionel Reynal, Principal Investigator, Ifremer Antilles Station, Martinique, welcomed the participants and invited guests. In his opening remarks he expressed appreciation on behalf of his institution to the countries represented for responding to the invitation to attend the first meeting of the proposed Lesser Antilles ad hoc Working Group on the sustainable development of moored FAD fisheries. In noting the similarities between the fisheries of Martinique and the rest of the Lesser Antilles, Mr Reynal gave a historical overview of the activities that Ifremer and the fishers of the French Antilles have undertaken to establish FAD fishing. He also mentioned the planned activities that have already been budgeted, in response to the monitoring results of the past activities.

7. In referring to the published information of Curacao with respect to its FAD development, the Chairperson expressed the appreciation of his institution to learn about the experiences in other subregional islands. He noted that FAD are viewed as an option to direct fishing activities away from the near-shore areas; he also expressed the hope that the participants will note the experiences and developments of each other's country with FAD in order to develop their FAD technology in a sustainable manner.

8. The FAO Regional Fisheries Officer welcomed the participants on behalf of the Director-General of FAO, and thanked Ifremer, the Conseil Régional, the Conseil Général and Europe (FEDER) for hosting and co-sponsoring the meeting. He advised the participants that sustainable FAD fishing was the most cost-effective way for their countries' artisanal fishers to expand their exploitation of large pelagic species, using their existing fishing fleet. He expressed the hope their presence was an indication of the priority their countries ascribed to the development of sustainable FAD fishing. Finally, he reminded the participants that developing sustainable FAD fishing conforms to the Code of Conduct for Responsible Fisheries.

9. The President of the Fisheries Commission of the Martinique Regional Council, welcomed the participants and invited guests on behalf of the President of his institution. He expressed the conseil's appreciation that neighbouring countries, by their presence, signalled their willingness to cooperate in the sustainable development of FAD fishing. He noted the ongoing cooperation between the islands of Dominica and Saint Lucia and the French Departments in the Lesser Antilles in training fishers in longline fishing. He also informed the meeting of the positive results, and their plans to continue. Finally he declared the meeting officially opened, wishing them success in their deliberations.

ADOPTION OF AGENDA

10. The FAO Regional Fisheries Officer invited the participants to nominate a chairperson for the Meeting. Mr Lionel Reynal was unanimously elected to the chair, but it was agreed that he would be assisted by the FAO Fishery Officer who would serve as the vice-chairperson, assisted by other FAO staff as and when other functions precluded them from chairing.

11. The agenda of the meeting was considered and adopted by the group without amendments. It appears as annex 1 of this report.

12. FAO and Ifremer participants alternated as rapporteurs for selected agenda items.

PARTICIPATION

13. There were nine overseas participants, from Antigua and Barbuda, Cuba, Curacao, the Commonwealth of Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago. There were three participants from the host country Martinique and one from its sister Department Guadeloupe. There were six resource persons from Ifremer, IRPM, the CARICOM Fisheries Unit and FAO.

14. The meeting was informed that the Participant from Barbados was unable to attend.

REGIONAL SYNTHESIS ON LARGE PELAGIC FISH FISHING: NATIONAL REPORTS

15. An overview of the status of assessments and management practices for the large pelagic fish species in the Western Central Atlantic, especially as they relate to the Lesser Antilles, was presented as a point of departure to the national reports. It was submitted that the large pelagic fish resources of the WECAF area have been divided into two groups, offshore with oceanic distribution, and coastal with a regional distribution, but that there are significant overlapping/mixing of these groups. The ongoing efforts to collect data on these have been implemented by the International Commission for the Conservation of Atlantic Tunas (ICCAT), and the FAO. Although there is cooperation and sharing of data between ICCAT and FAO, regional investigators have reported that more than 50 percent of the countries in the WECAF area may be reporting their data on large pelagic species incorrectly or under-reporting. Hence they caution that assessments using the existing data sets may be questionable.

16. Although there is a modest tradition of targeting both the oceanic and coastal pelagic fish species in the region, the practice was restricted to fishing around drifting objects and trolling. Fishing on moored FAD for the large pelagic fish species is a relatively new practice in this region, and the management of this activity is advisable if it is to become sustainable. It is expected that the information required to manage the development of moored FAD fisheries can complement the efforts required for improving the database on the large pelagic fisheries in the WECAF area.

Antigua and Barbuda

17. At least 35 of the fishing vessels registered with the Fisheries Division in Antigua and Barbuda claim to be targeting the large pelagic fish species. They are predominantly commercial and recreational sport fishing vessels, and they range in length from 6.0 to 17.5 metres. Some artisanal fishers also engage in opportunistic targeting of the large pelagic species by trolling to and from the traps on the outer banks.

18. The species most targeted is the blue marlin, because of the points it attract during tournaments. However the landings usually include: yellowfin tuna, wahoo, dolphinfish, king mackerel, cero mackerel, Spanish mackerel, Atlantic sailfish, blackfin tuna, skipjack tuna, and little tunny. The gear normally used is the rod and reel and the handline.

19. Actual data collection from the vessels in this sector of our fisheries is usually difficult, except at tournaments, when censuses are done. At other time fishers usually dispose of their catch by selling directly to restaurants, hotels, supermarkets and housewives. Hence we have estimated that large pelagic species landings in Antigua and Barbuda amounts to no more than 20 percent of total annual landings in the fisheries sector. There is no specific national management strategy for the large pelagic species at present.

Cuba

20. The pelagic fishing fleet in Cuba has been reduced over the last 10 years. At present 42 vessels are dedicated to pole and line and longline fishing, targeting pelagic fish species such as: skipjack, blackfin tuna, yellowfin tuna, white marlin, sailfish, and the common dolphinfish. The gears used in targeting the large pelagic species are the pole and line and the surface longline with as many as 500 hooks. At least 19 of the vessels described above are used specifically to engage in longlining.

21. Data from the large pelagic species fisheries is collected via a sampling plan in all fishing ports. This system records data by species, effort, boats, gear and area fished. Part of the catch from the smaller tunas is canned for export, while the balance is sold in the local markets. Cuba has no management regulations for large pelagic fish species generally, except that there are prohibitions on landings of skipjack and blackfin tunas below 30 centimetres fork length.

Curacao

22. The fishing fleet of Curacao has experienced a significant decline during the last few years mainly because the import duties and the cost of fuel have risen markedly. From a fleet of 435 vessels only 111 (25.5 percent) are actively fishing; the others are idle due to mechanical and/or financial problems, such as migration of owners. The fisheries is predominantly artisanal, and although there is no clear distinction between target species and bycatch, the large pelagic species with the highest market value include: dolphinfish, wahoo, and to a lesser extent, marlins and tunas. The longline vessels predominantly target the large pelagic species such as: bigeye tuna, yellowfin tuna and swordfish. Dolphinfish jacks, sharks and escolar are considered bycatch. The catch from these longline vessels is predominantly exported.

23. Curacao had a break in its fisheries data collection. Since its resumption (in 2000) data on catch and effort are being collected at landing sites on a daily basis, using a sampling method. It was realized that monitoring of the fisheries require at least 2 years data to show trends; for example, previous data showed rainbow runner contributing a constant 10 to 15 percent of the pelagic landings, but it has not been significant in the recent data. Based on this new data, it was concluded that there was a strong correlation between boat length and catch per unit effort. The government of Curacao intends to expand the number of longline vessels, to take greater advantage of the large pelagic fish resources in its fishery zone while being mindful of overfishing. It is also expected that reliable fisheries data will function as a basis for future Island Fishery Ordinance.

Commonwealth of Dominica

24. Pelagic fishing is a very important component of the fisheries sector in Dominica. Some 455 vessels (47 percent) of its fleet target the large offshore pelagic fish species in its waters, during the period January to June each year. The vessels range in lengths from 5.5 to 10.6 metres, and most of them operate within 12 miles of the coastlines. Total landings of these species amounted to 367 tons in the year 2000. This was equivalent to 34 percent of the total fish landings for that year. The fishing methods used in targeting those species were longline fishing, and trolling handlines. The species landed from these two methods include yellowfin tuna, kingfish, dolphinfish, marlin and swordfish.

25. Fisheries data collection in Dominica is done using a random sampling method in the rural landing sites supplemented by the purchasing records of the centrally located Roseau Fisheries Complex. The Government of Dominica is benefiting from a technical assistance activity, which provides training to artisanal fishers in fishing for large pelagic fish species. It also benefited from infrastructural improvements donated by the government of Japan; this assistance increased the country's storage and marketing capacity – especially for the large pelagic fish species. Although the Fisheries Division is mandated to manage the fisheries resources of the country, fisheries regulations have not been brought into force; in the interim attempts to promote cooperation with the fishers through regular sensitization and extension activities are ongoing.

Grenada

26. Grenada has developed its large pelagic fisheries with the technical assistance primarily from the Cuban Government and later from the Japanese government. Not only did the Grenadian fishers embrace the Cuban longline technology but also they began to adopt a scaled down version of the Cuban longline gear to operate from their many smaller, artisanal boats. More recent technical assistance from the Government of Japan complemented their efforts to target the large pelagic fish species. Today there are about 922 fishers, that operate from 385 vessels targeting those species in Grenada, predominantly with longline gear; the vessels range in length from 4.2 to 18.2 metres (14 to 60 feet), and fish for periods lasting from 1 to 7-day trips. The species landed include yellowfin tuna, swordfish, blue marlin, dolphinfish, wahoo, kingfish, sailfish, and blackfin tuna. The longline fishery mainly targets yellowfin tuna for high quality export to the USA by cargo plane

27. Grenada's data collection of large pelagic species is more complete than for the other species and species groups in its fishing industry. The fisheries division estimates that it captures data on 80 percent of the large pelagic fish species landed. The system used for large pelagic species is a total sampling at the 6 fish markets around the country, where they are landed. Effort data is also recorded for the large pelagic fisheries. Grenada has a draft fisheries management plan, but no specific strategy for large pelagic fish species have been elaborated.

Guadeloupe

28. Small artisanal vessels ranging in lengths from five to nine metres dominate the fishing fleet of Guadeloupe. There are 746 registered fishing vessels at present, and the majority of these vessels targets the large pelagic fish species during the "la traine" (trolling) season. The principal species targeted, during "la traine" are dolphinfish, wahoo, and the Spanish mackerel. The gear used is the handline. The number of professional fishers in Guadeloupe has fluctuated significantly since 1997.

29. Ifremer has collected logbook data on the moored FAD fishery from 1992 to 1996 on the Caribbean coast. Since then there has been no system in place for collecting fisheries statistics in Guadeloupe. There are no management restrictions on the capture of large pelagic fish species in Gaudeloupean waters.

30. It has been noted that Guadeloupians have a per capita consumption of more than 30 kilograms of seafood. Their production has been less than the demand, relative to the large pelagic species for example; imports have increased from 42 tons of frozen dolphinfish in 1999 to 164 tons in 2000.

Martinique

31. The fishing fleet and the number of active fishers in the Martinique have been relatively stable for a number of years. The vessels targeting the large pelagic fish species range in lengths from 6 to 8 metres. Fishers targeting the large pelagic fish species essentially operate off the insular shelf. Some practice trolling under drifting flotsam and/or birds flights ("pêche à Miquelon") from December to June venturing as far as 60 miles from the shore; others practice drift fishing by deploying weighted, vertical lines at depths of 50 to 80 metres deep while catching flyingfish. Approximately 58 percent of the vessels targeted the large pelagic species in 1994.

32. Large pelagic fish species amounted to 830 metric tonnes of the total pelagic fish landings in Martinique – 1 200 metric tonnes – in 1987. The species landed include tunas (370 tons), dolphinfish (245 tons) and wahoo (129 tons). An intensive sampling of the catches of the overall fisheries was implemented in 1987 by l'Institut de recherches pour le développement (IRD), followed by a similar although lighter sampling effort implemented by the Comité des pêches from 1991 to 1993. Ifremer has collected logbook-data on the large pelagic fish species from 1990 to 1996 according to the type of fishing, in relation to the development of the moored FAD fishery. Ifremer has been conducting biological data sampling of large pelagic fisheries landings through road surveys, including moored FAD fishery, since 1998. Except this limited sampling there is no system in place for collecting exhaustive statistics in Martinique by now.

Saint Kitts and Nevis

33. The large pelagic fish fisheries of Saint Kitts and Nevis has been the only subsector of the fishing industry that has consistently shown significantly increased landings over the last 6 years. The data does not include landings from sport and recreational fishers, but the figures recorded for 1995 amounted to approximately one ton compared to 29 tons in 2000. Approximately 50 fishers who operate from 19 vessels practise trolling; they venture as far as 35 miles offshore to target species such as dolphinfish, tunas, kingfish and blue marlin. The vessels range in length from 5.5 to 9.7 metres.

34. Data collection generally has been a tedious exercise largely due to fishers' resistance; where actual sampling is not possible, fisher-supplied data does not always distinguish between species. A major issue affecting the development of the large pelagic fish fisheries is the unavailability of storage facilities. This has constrained fishing effort at crucial times during the trolling season for the large pelagic species. There is no specific management regime in force for large pelagic fish resources.

Saint Lucia

35. The fishing industry in Saint Lucia has a fleet of 994 registered vessels, which are operated by 1993 fishers. The vessel types include the traditional dugout canoe, fibreglass pirogues, transomed vessels and 4 longliners. The lengths of the vessels in the fleet vary from 3.5 to 13 metres. The fishing season for targeting the offshore pelagic species ("la trane" or the trolling season) runs from January to June. Trolling lines and surface longlines targets the large pelagic fish species; they dominate the overall production in the fishing industry, contributing 68.3 percent of the total landings for 2000. The dominant species are dolphinfish (29.8 percent), tunas (25.3 percent), and wahoo (13.0 percent).

36. There is an ongoing strategy of training fishers – with technical assistance from the government of France to use pelagic fishing techniques to target the large migratory fish species. Saint Lucia have also benefited from technical and infrastructural assistance from the government of Japan, which is intended to facilitate further expansion of its efforts to target the large pelagic fish species. Data collection in Saint Lucia is randomly done at the many fish landing sites around the island. Statistics on large pelagic fish landings are collected from the records of the major fish markets/depots.

37. There is no management regime for the large pelagic fish species in force.

Saint Vincent and the Grenadines

38. The fishing industry in Saint Vincent and the Grenadines has a fleet of about 600 fishing vessels, operated by approximately 1 550 fishers. The vessels range in lengths from 4 to 20 metres. The large pelagic fish species contribute about 25 percent (284.1 tons) of the total fish landings (1 136.4 tons). The gear used to target the large pelagic fish species is trolling lines and surface longlines with as many as 300 hooks. The species targeted by these gears are yellowfin tuna, bigeye tuna, swordfish, dolphinfish, blue marlin, wahoo, and kingfish. Approximately 37 percent of the large pelagic fish landings are exported as fresh fish.

39. Fisheries data is generally collected via a system of stratified cluster sampling. Data on large pelagic fish landings are collected at the major fish markets with storage facilities. There are no management strategies in force for the large pelagic fish species.

Trinidad and Tobago

40. The fishing industry is largely artisanal, but the fishing fleet also includes multigear longline vessels, as well as a small number of semi-industrial and industrial shrimp trawlers. They target a variety of species, including coastal pelagic and demersals as well as the large oceanic pelagic fish species. There are approximately 1 536 registered vessels in the fishing fleet. The estimated total fish landings in 1999 was 10 000 metric tonnes. The industry provides direct employment for an estimated 13 000 persons, and indirect employment for an additional 50 000 persons.

41. The artisanal fishers operate open fibreglass vessels ranging in lengths from 6 to 10 metres, and they principally target coastal species such as: wahoo, kingfish, Spanish mackerel, flyingfish, and sharp-nose, hammerhead, black tip and small tail sharks. The major fishing gear of the artisanal fishers is the gillnet, followed by the handline and the trolling line. The semi-industrial and industrial vessels range in lengths from 14 to 23 metres. They are equipped with surface longlines from which 300 to 1 000 hooks target the oceanic pelagic species such as: yellowfin tuna, bigeye tuna, swordfish, and dolphinfish, with sharks, Spanish mackerel, and blackfin tuna being considered as bycatch.

42. Data from the fishing industry is collected randomly through a combination of enumeration and sample surveys at selected artisanal landing sites; data for the offshore fleet (industrial and semi-industrial) is collected from their export and domestic sales records. Total landings are estimated using the results of frequent censuses of active fishing vessels at both the enumerated and nonenumerated landing sites.

43. Trinidad and Tobago established a Monitoring and Advisory Committee on Fisheries to promote self-regulation and consensus with respect to management measures. This mechanism has established strategies such as season and area restriction on demersal shrimp, and mesh size increase for gillnets. Although there are no specific local regulations on fishing for the large pelagic fish resources, the government has ratified the ICCAT convention and plans to adopt it into local legislation.

A WORLD REVIEW OF FISHING TECHNIQUES USED IN ASSOCIATION WITH FAD: POTENTIAL INTEREST TO LESSER ANTILLES COUNTRIES

44. The fishing gear used around FAD depends on the type of FAD, the depth in which it is deployed, and the prevailing sea and weather conditions. If the FAD is a basic raft or buoy (Surface FAD) it may attract fish at the surface only. Another type with attracting materials/devices at several levels below the surface buoy may attract fish at different levels in the water column. It has been observed that moored FAD attracted more large specimens deeper in the water column in addition to the juveniles they attract at the surface

45. In general the fishing techniques which can be used include: handlining, longlining, pole and lining, fishing with trolling lines, gillnetting, the use of scoop nets and liftnets, and mid-water fish trap. The priority is usually to ascertain the depth at which the targeted fish species are found since this could vary with season. Initially efforts should be directed over a range of depths to test where the sizes and species of most economic interest occur.

46. Fishing on a moored FAD is usually directed up current of the FAD; the main task is to get the baited hook (s) at the desired depth as quickly as possible. Weights are sometimes used to get the bait to the desired depth. In the Pacific and Indian oceans a technique that combines a weight with chum (minced fish) is practised. Various other configurations of drifting and handlines, short horizontal and vertical longlines are also used in association with FAD fishing.

47. The advantages and disadvantages of certain fishing techniques in association to FAD were noted. For example:

- Experience in other regions of the world shows that small-scale fishers can increase their catches from below the surface in deeper waters where shoals of species are known to associate with moored FAD;
- The fishing near FAD may be seasonal only, and reflective of the availability/migratory nature of large pelagic fish species, therefore fishers should be in a position to use other methods in the off-season; and
- The likelihood that drifting gillnets and surrounding nets can, while harvesting a large catches in one set, snag (entangle) the FAD and also harvest significant numbers of juveniles (some countries have had to introduce rules to mitigate the harvesting of the juveniles).

48. While FAD have been experimental in the region for more than 30 years it should be noted that a key element is still to find a way of extending the life of moored FAD. Considering the raised expectation that installation of a FAD can engender, it is critical to carefully monitor fishing yields from around them, in order to document whether such yields are and can be sustained. It is also critical because there are prevailing uncertainties about the extent of the resources that are routinely targeted around the FAD.

REGIONAL SYNTHESIS OF THE DEVELOPMENT OF MOORED FAD FISHING

Antigua and Barbuda

49. Currently, there is no official policy on the development of FAD fishing in Antigua and Barbuda. The fishery administration is not officially aware of any FAD fishing operations either,

but unofficially has heard of such activities involving sport fishers clandestinely. As a result there is no information on the location or performance of the alleged FAD fishing activities.

50. Antigua and Barbuda has a draft fisheries management plan, but there is no explicit strategy on fishing for the large pelagic fish species. The Fisheries Division is considering a strategy to sensitize both fishers and policy-makers about the potential advantages of developing and managing moored FAD fishing for artisanal fishers, to target the large pelagic fish species. The hope was expressed that this meeting will provide additional insights for them to further this strategy.

Cuba

51. The employment of FAD for fishing of large pelagic fishes is in an experimental phase. They have only been moored in the oriental north coast with good results. The FAD used is similar those deployed in Martinique.

52. In about three months they have obtained some ten tons of large pelagic fish species; initially the catch was mostly spearfish, but later the species breakdown consisted of about 60 percent white marlins, while 25 percent was sailfish, and 15 percent was the common dolphinfish. The high cost of these devices has stopped its massive introduction; nevertheless they are considered in the plans for the development of the pelagic fisheries.

Curacao

53. The Curacao FAD project has been in existence since 1993. During the several design-modifications the present version has evolved as a result of experience. The key elements of the design are:

- The use of a spar buoy, because of its suitability to choppy seas with short wave periods. An observed disadvantage was the need for extra ballast, but using extra mooring-chain can offset this.
- There is only one mainline, which is attached to a single chain to which liberal sacrificial anodes are attached.
- The anchor is a one-piece concrete block with a reinforced mat and U-beam (the ratio of steel to concrete is about 1:4).
- Strands of nylon rope are now used as underwater attractors; they are enmeshed in the chain. This has replaced other materials because of its durability and less drag characteristics.

54. The location of the FAD is important. A deep water FAD should be deployed in an area where migrating fish are known/likely to pass.

55. Although we have no well established data set the results so far and the lessons learned have been such that funding for five new FAD was secured, these are under construction for imminent deployment. The extension of the programme to the Sister Island of Bonaire is also planned.

Commonwealth of Dominica

56. The FAD concept was introduced in Dominica in the 1980s. The first FAD was constructed and deployed with the assistance of the FAO. Since then a total of 11 FAD was officially deployed

from various landing sites around the island, typically within three to five miles offshore. Several training sessions in the use and merits of FAD were conducted. The practice of FAD construction evolved into custom of combining locally available material such as bamboo, used tyres, and coconut fronds with imported materials such as rope, chain, buoys, radar reflectors, swivels and shackles.

57. Fisher interest in FAD remains high, and there are reports of some experimenting with materials such as pieces of old seine nets and plastic containers as attractants and floats respectively. Some of these activities reported occur clandestinely, at distances between 7 and 15 miles offshore. It was noted that the continued use of FAD has extended the normal season for targeting the large pelagic fish species into July and August. Presently FAD fishing is not systematically monitored. The fisheries division is contemplating a co-management strategy in the absence of firm regulations.

Grenada

58. In the early 1990s the Grenada Fisheries Division deployed two FAD. Although it was well established that fishers had good catches during the time they were in position, no official catch data was kept. One FAD was deployed with FAO assistance, in a depth of approximately 364 metres off the East coast of Grenada. Species caught on this FAD included yellowfin tuna, dolphinfish, kingfish, and other smaller tunas. The second FAD was constructed of bamboo by the Fisheries Division (1998), and deployed at a depth of about 200 metres off a fishing beach. This latter FAD lasted about six months.

59. The performance of the two FAD so impressed the fishers that they have since anchored two unused wooden-vessels on the site of the latter FAD. Presently 20 to 30 fishing vessels fish around these vessels targeting kingfish and blackfin tunas. It was noted that the Blackfin Tunas are predominantly large specimens but not systematic data collection effort has been directed to this particular activity. Presently the focus of the Department of Fisheries is on the monitoring the artisanal and longline fisheries for large pelagic fish species.

Guadeloupe

60. FAD deployment has been considered as one of the major fisheries development strategies in Guadeloupe in recent years. Fishing on the first moored FAD began in Guadeloupe in 1988. Since then the number of FAD being fished has increased drastically to about 200 units, at present. Most of the FAD today are privately constructed and deployed; as many as 10 fishers may own one FAD, but the number is usually four or five. In the past, FAD were deployed at an average distance of 15 miles offshore, but now they are being carried progressively farther and into deeper waters (about 50 miles offshore, and in depths of more than 2 000 metres); as a result the turn-over of FAD is very high.

61. The designs of the FAD have evolved, as fishers become more experienced from working with successive units.

62. The activities and issues regarding FAD fishing in Guadeloupe, especially production data has been partially monitored by Ifremer through logbooks data collection from 1992 to 1996. The FAD fishery seems to have been developing since 1992, earlier than in Martinique, thanks to the use of the drifting vertical single hook line, used traditionally to fish big pelagics around seamounts in Guadeloupe. The use of this traditional fishing gear around FAD allowed Guadeloupean fishers

to fish deeper (down to 150–200 metres) and catch big pelagics (essentially yellowfin tunas weighing more than 14 kilograms and blue marlins). The increasing catches of big pelagics induced an increase in the average catches per fishing trip around FAD and induced the development of the fishery. In addition FAD fishing is regulated under Préfectoral order.

Martinique

63. Fishing for the large pelagic fish species on moored FAD has been developing in Martinique since the mid-1990s. It has emerged as a year-round practice, off the insular platform, in depths of about 1 000 to 2 000 metres. The deployment of FAD in Martinique was initially funded by public organizations. The number of moored FAD in Martinique is presently much lower than in Guadeloupe where FAD are the private property of fishers.

64. Moored FAD were first deployed in the early 1990s on the Atlantic coast but development of FAD fishing begun on the Caribbean coast around the late 1990s. At the beginning, fishers only used surface trolling lines around FAD. As part of its FAD fishing development in Martinique, Ifremer facilitated the introduction of the drifting vertical, single-hook line used in Guadeloupe. Since then the FAD fishery seems to have been developing as in Guadeloupe, thanks to the increase of big pelagic catches. However, average yields remains lower in Martinique than in Guadeloupe maybe because of the number of FAD being much lower in Martinique than in Guadeloupe. Nowadays, the main species landed from FAD include blue marlin, big yellowfin tunas and blackfin tuna.

65. The only up-to-date statistics on the FAD fishery in Martinique is derived from biological data of partial sampling implemented by Ifremer since 1998.

66. Research is being conducted by Ifremer to improve the designs of the FAD, based on the study of the causes of losses and on the FAD behaviour modelling function of swell and currents.

Saint Kitts and Nevis

67. The first FAD was introduced in Saint Kitts in 1988; it was a Mac Intosh prototype. Since then the history and performance of FAD has been chequered, shrouded in secrecy, and with no tangible record of their successes or failures. Clandestine designs and deployments have been reported occasionally by fishers, and recent observations of landings have yielded enhanced landings of large pelagic fish species among certain fishers.

68. The data collected seems to suggest that FAD is indeed improving landings for some fishers. The Fisheries Management Unit has initiated a strategy to offer technical and material assistance to fishers with the objective of gaining their cooperation and confidence, in order to be in a position to better monitor the performance of FAD. The Ministry of Fisheries has also introduced an annual Minister's prize to commemorate World Food Day as another incentive for fisher cooperation; the prize is awarded to the fisher who the Fisheries Management Unit can identify as the most cooperative and productive fisher for the year.

69. Presently no data specific to the large pelagic fish landings from FAD fishing are available. The situation in Nevis mirrors that in Saint Kitts.

Saint Lucia

70. Saint Lucia had as many as 12 FAD until recently. Many of them were lost through boating traffic. The one that has remained functional is heavily used. Fisher-interest in FAD has been such that the government of Saint Lucia is in the process of repairing or replacing many of the damaged or lost units. One French-donated FAD was deployed near the Souffriere Marine Management Area (SMMA), and it lasted for 14 months.

71. All the catch data was not reported by the fishers yet the records indicated that a total of 36 marlins, ranging in weights from 36.4 to 386.4 kilograms were caught around that FAD. Two of the other lost FAD were Japanese designs, but proper monitoring was not detailed enough to allow for comparison of the different designs.

72. Recent cooperative exchanges between Martinican and Saint Lucian fishers have resulted in technical adjustments in the fishing practices of Saint Lucian fishers around FAD. The end result was the landing of specimens of bigeye tunas from the midwater around their FAD. Previously Saint Lucian fishers only concentrated their fishing efforts around FAD near the surface.

Saint Vincent and the Grenadines

73. The Fisheries Extension Unit constructed an experimental moored FAD consisting of a bamboo raft, which it deployed about five miles offshore at a depth of 50 metres. The choice of materials was deliberately kept to a minimum by using mostly what was readily available. The other reason was because it was intended only to sensitize and gauge fisher interest.

74. The FAD only lasted for three weeks; hence it was difficult to measure its performance. It was established that many fishers became curious and actually fished around it. One of those who report on their activities around the FAD claimed to have landed in excess of 313.6 kilograms of skipjack tuna, bonito and dolphinfish.

75. There is still official interest in FAD fishing, There are plans to initiate an extension strategy to cultivate fishers' support in a partnership for its development and management.

Trinidad and Tobago

76. There is no active moored FAD fishing in Trinidad and Tobago at the present time. The capacity and technology to construct and deploy moored FAD has been demonstrated by the state-owned "Caribbean Fisheries Training and Development Institute" (CFTDI), with Japanese technical assistance, JICA (Japan International Cooperation Agency). Three experimental bamboo-rafts were deployed as moored FAD, off the insular shelf of Tobago in 1999. Data on the activities of fishers around the FAD is unavailable because they did not return the forms that they were given to record their landings.

77. Although the rafts were not replaced, there has been in general considerable interest in coastal communities, in Trinidad, to establish aggregating devices. The Fisheries Department is aware of this significant interest for the deployment of demersal FAD and artificial reefs. No official policy has been formulated on the development of moored FAD so far.

78. CFTDI (Caribbean Fisheries Training and Development Institute) has conducted training in the development and application of FAD for other Caribbean countries.

INTRODUCTION TO THE SUSTAINABLE DEVELOPMENT CONCEPT IN FISHERIES MANAGEMENT

79. For Fisheries Management to be sustainable, it has to be contemplated at the same time as the exploitation and development of a fish stock /resource; it must have to be 'responsible'. Being responsible implies excluding all destructive practices as defined in the Code of Conduct for Responsible Fisheries. In the context of considering the sustainable development of moored FAD fishing, being 'responsible' means avoiding the use of gear that can easily be lost and can continue to fish (for example materials of entanglement, midwater fish traps and seines).

80. The sustainable development concept should take the unpredictability and variability of fish populations into account when designing fisheries management systems. For example the management system for moored FAD fishing should:

- include provisions for regular consultations among the parties concerned to promote understanding and full cooperation;
- develop mechanisms for resolving conflicts;
- promote research to improve fishing gear selectivity and species reaction to gear;
- set agreed management objectives and identify related reference points, incorporating the "precautionary approach" and
- develop contingency plans for natural and human-induced disasters.

81. Some of the actions that should be contemplated at the outset of the sustainable development of moored FAD fishing for the large pelagic fish species are:

- establishing a vessel registration/licensing system;
- defining a real-time reporting of data on vessel performance and landings;
- making contingency plans for taking corrective actions when set targets are breached (e.g. closures or limited entry) and
- defining a plan to optimize social and economic stability, through fair and equitable distribution of benefits.

DISCUSSION OF NATIONAL REPORTS

82. After the presentations by the national representatives some of the salient interventions from the floor included the following:

- There are significant differences between fishing vessel classifications that could preclude some comparisons such as, fishing power for statistical purposes. It was suggested that attempts to standardize definitions might assist in clearing up such discrepancies.
- The need for rationalization of regulations especially for managing the fishing of the highly migratory large pelagic fish species associated with moored FAD was identified, for example, regulations to mitigate against the harvesting of the juveniles below an agreed size.
- It was noted that moored FAD may reduce selectivity and also attract small specimens of the large pelagic fish species. The response elicited by this comment was that the same moored FAD attracted also large specimens of the same or associated species-

groups deeper in the water column than the juvenile at the surface did. It was then suggested that an appropriate strategy should be to direct the fishing gear to the deeper reaches of the FAD.

- The potential for conflicts was identified in countries where there are no formal regulations to govern the activities of fishers around FADS. It was suggested that governments should construct, deploy, and manage activities around them, or attempt to establish partnerships with fisher-groups to manage the FAD jointly.
- The issue of conflicts between fishers from neighbouring countries where FAD are deployed near to poorly demarcated maritime boundaries was discussed. While agreeing that cooperation among the fishers on both sides were desirable, it was also recognized that the underlying issues were policy and political in nature – involving delimitation agreements in the first instance.

THE LESSER ANTILLES AD HOC WORKING GROUP ON THE SUSTAINABLE DEVELOPMENT OF MOORED FAD FISHING: FUNCTION AND OPERATION

Role of the Working Group

Scope

83. The scope of the Ad Hoc Working Group is the sustainable development of moored FAD fishing in the Lesser Antilles. In undertaking its work, the Working Group will pay due attention to the conservation and management of large pelagic fisheries in the WECAFC Region and related or interacting species or fisheries.

84. The working group will take a multidisciplinary approach to the sustainable development of moored FAD fishing for large pelagics.

The Goal of the Working Group

85. The goal of the Working Group will be to contribute to the sustainable development and management of large pelagic fisheries associated with moored FAD.

86. In pursuing this goal the Working Group will contribute to the fulfilment of national and regional responsibilities for shared pelagic fish stock management under the code of Conduct for Responsible Fisheries. Particular attention will be paid to Article 8.11: "Artificial reef and fish aggregation devices".

Terms of Reference

87. Large pelagic fish is a shared resource and therefore the Terms of Reference may apply at regional and/or national levels as appropriate.

88. The Working Group with the support of FAO, WECAFC Secretariat and Ifremer will act in an advisory capacity to guide and facilitate the sustainable development of moored FAD fishing in the Lesser Antilles.

89. Specifically, the Working Group will:

- (a) Use the best available scientific information, review periodically and report on the magnitude and state of moored FAD fishing in the Lesser Antilles;
- (b) Promote and facilitate national and regional monitoring and research programmes on FAD fishing, including the harmonization of methodologies;
- (c) Collect data and information on moored FAD fishing which can be used for the large pelagic fisheries assessment and management in the WECAFC Region (e.g. biological, environmental, socio-economic);
- (d) Review periodically the economic and social situation of the moored FAD fishing at national and regional levels;
- (e) Evaluate when necessary the impact of national and regional management measures on the economic and social aspects of these fisheries;
- (f) Integrate moored FAD fishing in national fisheries management plans;
- (g) Formulate projects and programmes as necessary ;
- (h) Promote the sharing of information and expertise;
- (i) Promote and coordinate acquisition of international aid in support of its activities;
- (j) Promote an extensive exchange of ideas and experiences regarding moored FAD fishing, including appropriate technologies;
- (k) Submit reports on its intersessional activities for consideration by the WECAFC;
- (l) Organize any other relevant studies requested by the Commission.

90. Initially the group will focus its attention on the following species associated with FAD due to their importance: yellowfin tuna, wahoo, dolphinfish, bigeye tuna, albacore, bluefin tuna, marlin, swordfish, shark, kingfish, blackfin tuna, skipjack, barracuda, and triggerfish.

Mode of Operation

Role of Countries

91. The members of the Working Group will play a leading role in its activities through the following activities and commitments:

- Participating in agreed activities of the Working Group, and ensuring the participation of appropriate experts.
- Implementing, at the National level, the work identified in the agreed work plan of the Group.
- Playing the role of host country for Working Group meetings on a rotational (periodic) basis.

92. It is suggested that countries should commit to the activities of the Working Group for a period of five years in the first instance.

Role of FAO

93. The FAO/WECAFC Secretariat will play a supporting role in the activities of the Working Group by:

- coordinating the activities of the Working Group (including facilitate procurement of funding);
- providing a technical secretary and technical backstopping;
- providing technical assistance and support to research;

- facilitating training and seek the collaboration of subregional training institutions, such as IRPM (Institut regional de pêche et de marine), UWI (University of the West Indies), UAG (University of French Antilles and Guyana) and, in Trinidad, CFTDI (Caribbean Fisheries Training and Development Institute), in this regard.

Role of Subregional Organizations (e.g. CARICOM (Caribbean Community), OECS (Organization of Eastern Caribbean States))

94. Subregional organizations have an important role to play in assisting their member countries to participate fully in the activities of the Working Group by:

- providing expertise;
- facilitating funding;
- collaborating with the WECAFC Secretariat and Ifremer in coordinating the Working Group and
- facilitating the decision-making process at the subregional level.

Communication

95. A mechanism for ongoing communication among Working Group members (e.g. internet) is essential to ensure that the work of the group is sustained between meetings. It must include all Working Group members.

96. The successful functioning of the Working Group also requires that each member country identify a national focal point through which communications will be directed.

97. The outputs of the Working Group will be communicated through Working Group reports to WECAFC and national fishery administrations via the Secretariat.

Working Group Meetings

98. The Working Group should meet once a year or every two years. The meetings should be of three to five days duration, and the Meetings should use cost-effective accommodations and institutional facilities.

INTERSESSIONAL WORKPLAN

99. The participants agreed on an intersessional work programme that includes the following themes:

- Data collection and monitoring of moored FAD. A spreadsheet was prepared for this purpose.
- Information exchange on all aspects of moored FAD fishing (through networking of the Working Group members).
- Communication and awareness targeting various audiences including fishers and fishing communities.
- Preparation in the concerned countries of National Programmes for moored FAD development and deployment, which should be incorporated in the national Fisheries Management Plans for large pelagics.
- Training (including exchange visits) in moored FAD construction and deployment.

- Research. The Ifremer has obtained partial funding from the "Conseil régional" for Martinique for a research project on moored FAD. The main objective of the project is to use acoustic surveys to monitor the fish population and its distribution on the moored FAD in Martinique and experimental fishing. Ifremer offered to disseminate the preliminary results of this project at the next meeting of the Group. Depending on the preliminary results, it may be possible to extend the acoustic surveys to neighbouring islands. Curacao offered to support the project in writing, if needed. The countries agreed that they could benefit from the results of the project.
- Research on the design of light, medium weight and heavy moored FAD was necessary. The objective should be to improve design, longevity and reduce costs. Ifremer is working on a computer programme for this purpose and would be requesting data and information from member countries of the ad hoc Working Group to test and validate the programme. Curacao volunteered to provide information.
- Case studies. The participants were keen on an appropriate management strategy for moored FAD. Some participants suggested comanagement while others felt it should be owned and managed by the state. It was suggested that case studies be done in Guadeloupe where moored FAD were privately owned and managed by fishers and in Martinique where moored FAD were owned and managed by groups of fishers or by the representative structure of the profession. The studies should be presented to the next meeting of the Group.
- The meeting decided to seek expert advice on the collection and evaluation of social and economic data on moored FAD fishing.
- The participants agreed that a Regional Cooperative Work Programme be elaborated for discussion and adoption at the Ad Hoc Working Group at the next meeting.

DATE AND PLACE OF THE NEXT MEETING

100. The meeting agreed that the next meeting of the group should be held in mid 2003, but deferred naming a specific time and place pending progress on the intersessional activities.

APPENDIX A

AGENDA

Monday 8 October 2001

8:30 – 9.00	Registration of participants
9:00 – 9:45	Opening of meeting
9:45 – 10:00	Review and adoption of the agenda
10:00 – 10:15	BREAK
10:15 – 12:30	Regional synthesis on large pelagic fisheries 20' review of the Western Central Atlantic large pelagic fisheries (R. Walters) 20' National report inclusive of discussion
12:30 – 14:00	LUNCH
14:00 – 16:00	Regional synthesis on large pelagic fisheries (national reports continued)
16:00 – 16:15	BREAK
16:15 – 17:00	A world review of the fishing techniques used in small scale pelagic fisheries and potential interest for the lesser Antilles countries (J. Prado)

Tuesday 9 October 2001

9:00 – 10:00	Presentation of a summary of a comparative analysis of the national report on large pelagic fisheries. Discussion on the status and development of large pelagic fisheries in the Lesser Antilles
10:00 – 10:15	BREAK
10:15 – 12:30	Regional synthesis on moored FAD fisheries development 20' National report inclusive of discussion
12:30 – 14:00	LUNCH
14:00 – 16:00	Regional synthesis on moored FAD fisheries development (national reports continued)
16:00 – 16:15	BREAK
16:15 – 17:00	Interest of moored FAD for regional fisheries

Wednesday 10 October 2001

09:00 – 09.15	Introduction to the sustainable development concept in fisheries (S. Singh-Renton)
09.15 – 10.15	Large pelagic resources in the Lesser Antilles and sustainable development of moored FAD fishing A review of the large pelagic stock assessment in the Lesser Antilles (Ifremer) A review of the Blackfin tuna in the Caribbean area (Cuba's representative) Participants to identify knowledge needed to achieve sustainable development and make recommendations for regional cooperation in research
10:15 – 10.30	BREAK
10.30 – 11.30	Technology of moored FAD and sustainable development Summary of the knowledge on moored FAD technology in the Lesser Antilles and presentation of further developments (A. Lebeau) Participants to identify knowledge needed to achieve sustainable development and make recommendations for regional cooperation in research
11.30 – 12.30	Exploitation of fish concentrations around moored FAD and sustainable development in the Lesser Antilles Summary of a comparative analysis of large pelagic exploitation around moored FAD in the Lesser Antilles. Presentation of a research program to enhance the knowledge on fish aggregations (M. Doray) Participants to identify knowledge needed to achieve sustainable development and make recommendations for regional cooperation in research Discussion on selective FAD fishing techniques to be developed or experimented (J. Prado)
12:30 – 14.00	LUNCH
14.00 – 15.00	Social and economical aspects of moored FAD fishing sustainable development Summary of a comparative analysis of social and economical aspects of moored FAD fishing. Participants to identify knowledge needed to achieve sustainable development and make recommendations for regional cooperation in research

15.00 – 16.00

Synthesis of Workshop recommendations. Confirmation of recommendations, any other matters; time and venue of next meeting.

Conclusion of the workshop.

Thursday 11 October 2001

09:00 – 12.00

Fishing trip around moored FAD with professional fishers

12:30 – 14.00

LUNCH

APPENDIX B

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The report of the First Meeting of the WECAFC Ad Hoc Working Group on the Development of Sustainable Moored Fish Aggregating Device Fishing, held in Martinique, Caribbean, 8-11 October 2001, includes information on the status of FAD development and fishing activities in the Lesser Antilles. It also includes an account of the group's deliberations and a record of the decisions and recommendations that the group made relative to the objectives of the meeting.

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